

Self Deployable Ultra-Lightweight Modular Unit for Habitat Structural Applications, Phase I

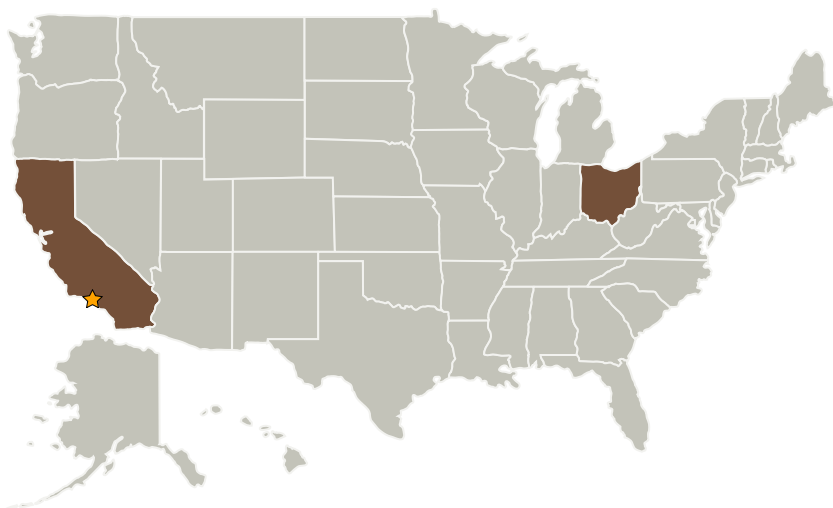
Completed Technology Project (2004 - 2004)



Project Introduction

Space deployable and rigidizable structures which are ultra-lightweight, and have high rigidity, space durability, and high impact resistance are desirable to improve the reliability and affordability of space structures. Some of the components currently in use such as shelters or transhabs use double-wall thick films with high internal pressure. All these hollow components are vulnerable in space because of the debris and meteorites that can strike them. They will lose their functions if hit and damaged by foreign objects. Besides, these deployable structures in space typically rely upon electro-mechanical mechanisms and mechanically expandable booms to deploy structures and maintain them in space for use, which occupy over 90% of the total mass budget in many cases. In this Phase I project, we propose to develop self-deployable, low-density microcellular foamed sandwiches from shape memory polymers or CHEM as structural components of space habitats. Such a structural module can be compacted into a very small volume to facilitate launching. The deployment energy is the heat from the sun. This concept greatly simplifies the entire operation, reduction in weight and cost, and improves reliability. They also feature great impact resistant. Foams processed by the conventional chemical-blowing agent have toxicity problems. Our microcellular CHEM foamed sandwiches do not involve any toxicity and will have higher mechanical properties than those processed by the conventional techniques.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Wright Materials Research Co.	Supporting Organization	Industry	Beavercreek, Ohio

Primary U.S. Work Locations

California	Ohio
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Seng C Tan

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.2 Structures
 - └ TX12.2.5 Innovative, Multifunctional Concepts